2/2- and 3/2-way directional seated valves type BVG and BVP

for any flow direction, zero leakage
all ports pressure resistant

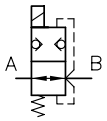
Perm. pressure p_{max} = 320 bar
Perm. flow Q_{max} = 50 lpm

Additional valves with same function:

- Type BVG 11(12 and 2), BVP 11(2) see appendix, sect. 5.1, Run-out design do not use for new layouts!
- Type BVG , BVP 1 D 7765 (Q_{max} = 20 lpm, p_{max} = 400 bar)
- Type NBVP 16 D 7765 N (Q_{max} = 20 lpm, p_{max} = 400 bar)
- Type BVE D 7921 (Q_{max} = 70 lpm, p_{max} = 400 bar)
- Type VP D 7915 (Q_{max} = 15 lpm, p_{max} = 400 bar)

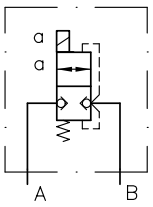
Design for pipe connection

Example: Type BVG 3 S-G 24



Design for manifold mounting

Example: Type BVP 3 R-G 12



2.2

1. General

These 2/2- and 3/2-way directional cone seated valves are available with electrical, hydraulic or pneumatic actuation. All ports are equally pressure resistant due to the internal pressure balance.
The zero or idle position is achieved automatically if the valve is not actuated due to spring return. They are of all steel design and all functionally essential internal parts are hardened and run maintenance free in oil; Cones and seats are ground.

2. Available versions, main data

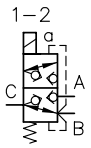
Order examples: **BVG 3 R/B 2,5 - WG 230**
BVP 3 Z - P

Table 1: Basic type and size [1]

Coding	Design and connection	Flow Q_{max} (lpm)	Pressure p_{max} (bar)
BVG 3	Pipe connection G 1/2 ISO 228/1 (BSPP)	50	320
BVP 3	Manifold mounting	50	320

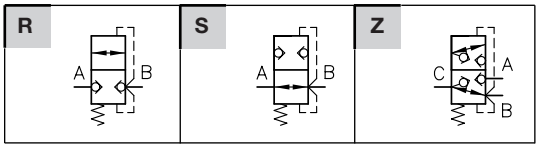
Complete symbols
(The actuation symbols apply to all flow symbols)

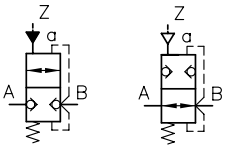
Pipe connection



BVG 3 Z - G...
BVG 3 Z - WG...

Table 2: Symbols



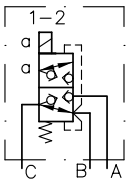


BVG 3 R - H BVG 3 S - P

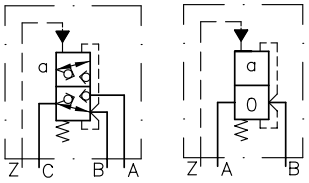
Table 3: Orifices
(in ports A, B, and C, see also sect. 3.1)

Coding	Ø (mm)	No. for subsequent orders BVG 3..	No. for subsequent orders BVP 3..	System or accumulator pressure range
B 2,5	2.5	7405 014 b	7405 013 b	about 300 bar
B 3	3	7405 014 c	7405 013 c	about 200 bar
B 3,5	3.5	7405 014 d	7405 013 d	about 150 bar
B 4	4	7405 014 e	7405 013 e	about 100 bar
[2]	0 [2]	7405 014 a	7405 013 a	--

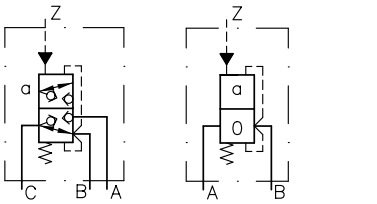
Manifold mounting



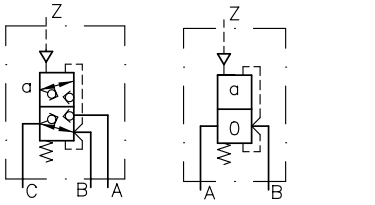
BVP 3 Z - G...
BVP 3 Z - WG...



BVP 3 Z - H BVP 3 R(S) - H



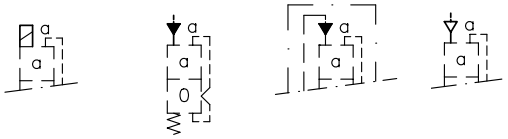
BVP 3 Z - H 1/4 BVP 3 R(S) - H 1/4



BVP 3 Z - P BVP 3 R(S) - P

Table 4: Actuations

Actuation	Coding with plug	Plug with LED	without plug	Main data, see also sect. 3.2
Solenoid	**G 12**	**L 12**	**X 12**	U_N = 12 V DC
	G 24	**L 24**	**X 24**	U_N = 24 V DC
	WG 110	---	**X 98**	U_N = 110 V AC, 50/60 Hz (98 V DC) [3]
	WG 230	---	**X 205**	U_N = 230 V AC, 50/60 Hz (205 V DC) [3]
Hydraulic	**H**			Control pressure: $p_{contr\ min}$ = 24 bar, $p_{contr\ max}$ = 320 bar
	H 1/4	Ext. control port G 1/4 (BSPP). Only with type BVP 3 !		
Pneumatic	**P**	Ext. control port G 1/4 (BSPP)		Control pressure: $p_{contr\ min}$ = 2 ... 3.5 bar, $p_{contr\ max}$ = 15 bar
Actuation symbols	Solenoid	Hydraulic Coding H 1/4	Hydraulic Coding H	Pneumatic



[1] Type BVG 11(12, 2) and BVP 11(2) see appendix, sect. 5.1, Run-out design do not use for new layouts!
[2] Undrilled for customized diameter acc. to Δp-Q-curve of the orifices, sect. 3.1
[3] DC-solenoid (98 V DC, 205 V DC) with plug featuring a bridge rectifier circuit

3. Further parameters

3.1 General and hydraulic

Installation position: Any

Overlapping with 3/2-way directional valves: Negative (transverse of one into the other flow direction is only completed when the switching position is achieved). All passages are interconnected during the switching operation.

Operating pressure: p_{max} = 320 bar

Static overload capacity: Ports A, B, and C approx. 2 x p_{max} (640 bar)

Body material and surface coating: Steel, zinc galvanized

Mass (weight) approx. kg

Complete with actuation	BVG 3 R BVG 3 S	BVG 3 Z	BVP 3 R BVP 3 S	BVP 3 Z
Solenoid	2.3	3.3	2.3	2.4
Hydraulic	1.9	2.9	1.9	2.0
Pneumatic	1.9	2.6	1.9	1.7

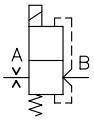
Pressure fluid: Hydraulic oil conforming DIN 51514 part 1 to 3: ISO VG 10 to 68 conforming to DIN 51519.
Viscosity limits: min. approx. 4, max. approx. 1500 mm²/s;
opt. operation approx. 10... 500 mm²/s.
Also suitable are biological degradable pressure fluids types HEPG (Polyalkylenglycol) and HEES (Synth. Ester) at service temperatures up to approx. +70 °C.

Temperature: Ambient: approx. -40 ... +80 °C
Fluid: -25 ... +80°C, Note the viscosity range !
Permissible temperature during start: -40°C (Observe start-viscosity!), as long as the service temperature is at least 20K higher for the following operation.
Biological degradable pressure fluids: Note manufacturer's specifications. By consideration of the compatibility with seal material not over +70 °C.
Attention: Observe the restriction regarding the operation duration in sect. 3.2. !

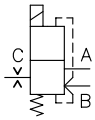
Perm. flow: Q_{perm} acc. to sect. 2 applies to p_{max} = 320 bar with solenoid actuation in usual pump circuits. With pressure < 150 bar (solenoid actuated) or with all other actuation modes Q_{perm} may be exceeded up to 50% as long as the back pressure is permissible.

Flow limitation: The max. flow has to be limited (depending on the pressure) by means of orifices in the case of accumulator circuits or if connected to high pressure circuits (circulation lines or central supplies) down to the specified Q_{max} (see sect. 2).
These orifices must be located always on the accumulator side. With valves type ..Z..- they are installed in port C. If mounting in port A or B is requested, this has to stated in uncoded text. For detailed description see table 3, sect. 2.

2/2-way-valve

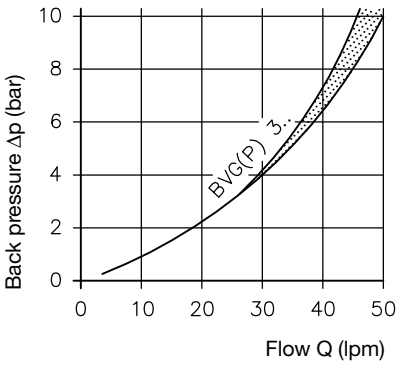


3/2-way-valve

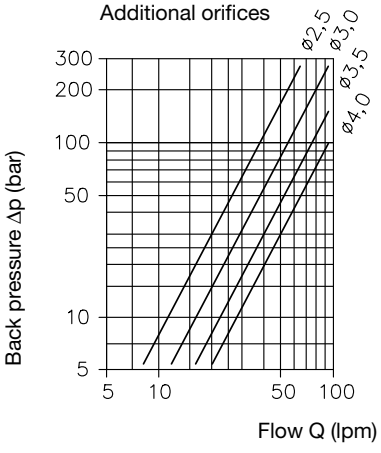


Δp-Q-curve

Basic valve



Additional orifices



Viscosity of the oil during tests approx. 60 mm²/s

3.2 Actuations

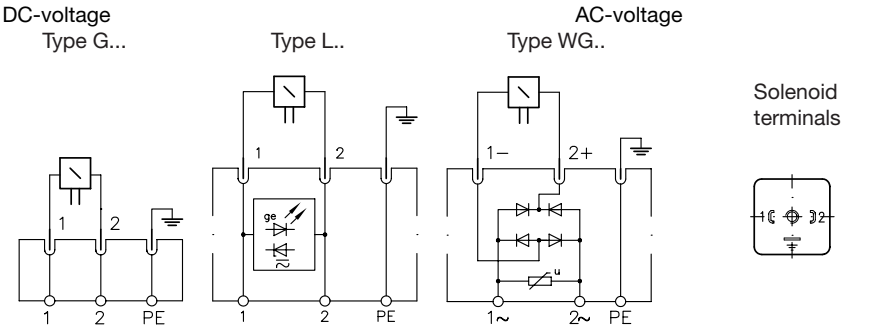
Solenoid

		The solenoids are manufactured and tested conforming DIN VDE 0580			
Coding		G 12 L 12 X 12	G 24 L 24 X 24	WG 110 --- ---	WG 230 --- ---
Nom voltage	U_N (V)	12	24	110	230
		(DC-voltage)		(AC-voltage, 50/60 Hz)	
Nom. power	P_N (W)	33.2	30.0	32.8	33.0

Plug DIN EN 175 301-803 (circuitry and symbol)

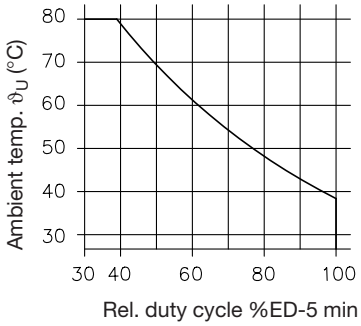
All plugs

For additional plugs, see D 7163



Switching time (guideline)	ON or OFF: approx. 50 ... 60 ms; with WG.. approx. 2-3 times prolonged
Switchings / hour	approx. 2000/h to be regarded as approx. evenly distributed
Protection class	IP 65 (IEC 60529) (plug properly mounted)
Insulation material class	F
Contact temperature	approx. 98° C, at 20° C ambient temperature
Cut-off energy	WA ≤ 0.5 Ws
Surface coating (solenoid)	DIN 50961-Fe/Zn 12 bk cC

Relative duty cycle during service (100% ED stamped on the solenoid)



		Hydraulic (Coding H, H 1/4)	**Pneumatic** (Coding P)
Control pressure	$P_{contr\ min}$	24 bar	2 bar
	$P_{contr\ max}$	320 bar	15 bar
Perm. residual pressure in the control line for save return to idle position		< 2 bar	---
Static over load capacity of Z		approx. 1.5 $p_{contr\ max}$ bar	approx. 1.5 $p_{contr\ max}$ bar
Control oil volume (geom.)		0.6 cm^3	3 cm^3
Housing material and surface coating		Steel (body) galv. zinc plated	Light alloy (body) black anodized

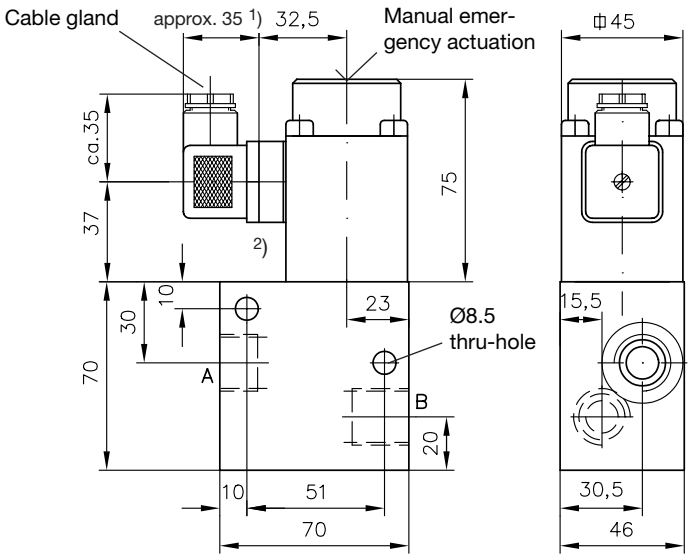
4. Unit dimensions

All dimensions are in mm and subject to change without notice!

4.1 Version for pipe connection

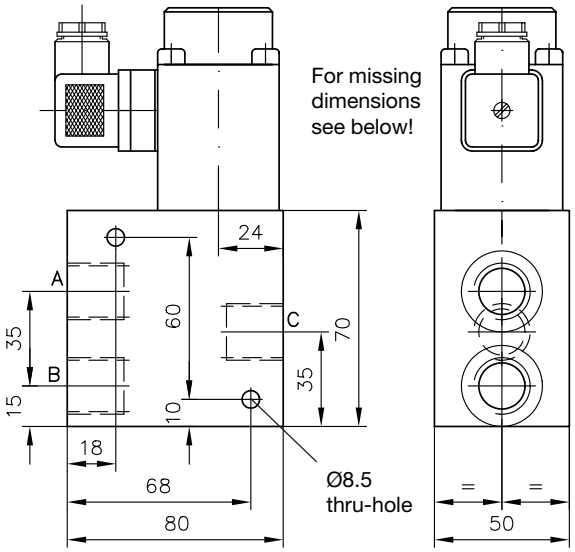
Illustrations are with solenoid actuation (coding **G..** or **WG..**), for other actuations see below

Type BVG 3 R(S)



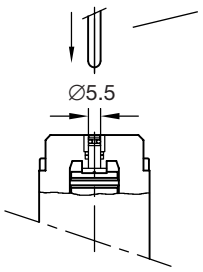
Ports conf. ISO 228/1 (BSPP):
A and B = G 1/2

Type BVG 3 Z



Ports conf. ISO 228/1 (BSPP):
A, B, and C = G 1/2

Manual emergency actuation



Actuation aid
(do not use any sharp-edged parts)

The valve may be actuated by pressing down the brass bolt visible from above by means of a steel pin or a screw driver etc.

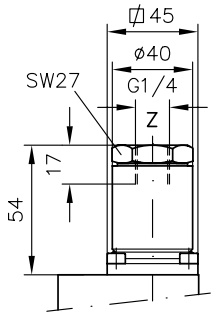
Note: All pressure apparent at port B loads on the cross section of the brass bolt Ø5.5 i.e. 100 bar or 240 N !

1) **Note:** This dimension is depending on the manufacturer and can be up to max. 40 mm acc. to DIN EN 175 301-803!

2) When required the solenoid may be rotat ed to the valve body by another 4x90° in addition to the standard assembly position illustrated here.

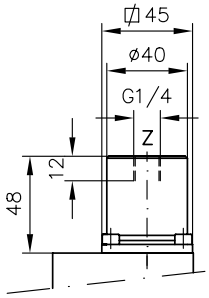
Hydraulic actuation

Coding **H 1/4**



Pneumatic actuation

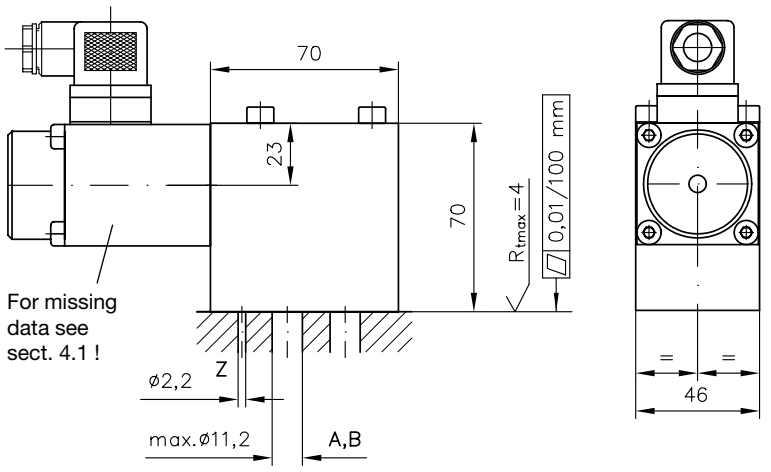
Coding **P**



4.2 Version for manifold mounting

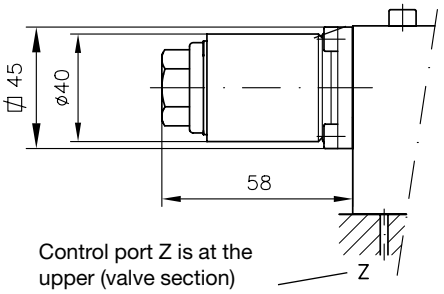
Illustrations are with solenoid actuation (coding **G..** or **WG..**), for other actuations see below 4.1

Type BVP 3 R(S)



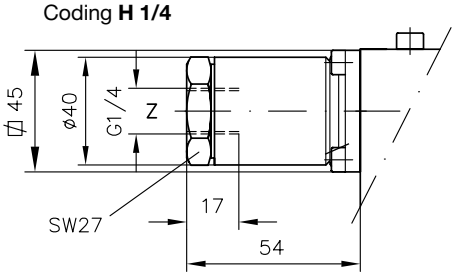
Hydraulic actuation

Coding **H**

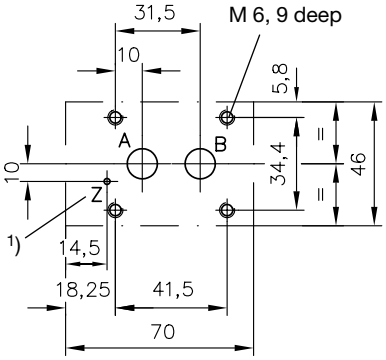


Control port Z is at the upper (valve section)

Coding **H 1/4**

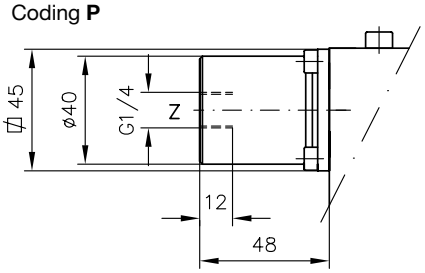


Hole pattern of the manifold (top view)

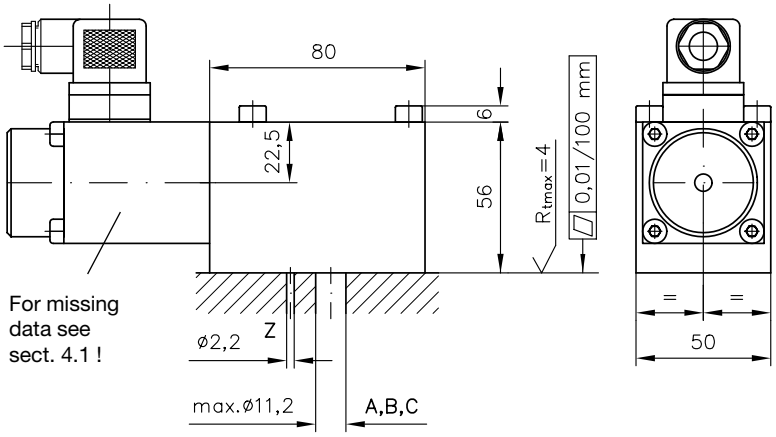


Pneumatic actuation

Coding **P**



Type BVP 3 Z

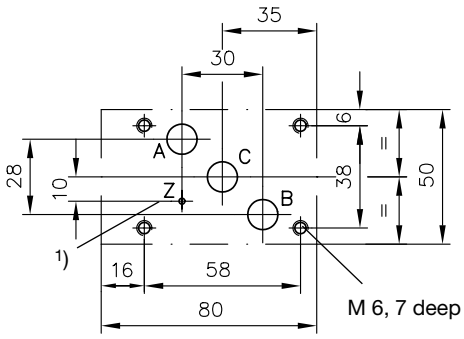


Sealing of ports A, B, and C via O-rings 13.95x2.62 NBR 90 Sh

Port Z:
via O-ring 2.54x1.78 NBR 90 Sh

Available as spare part, seal-kit DS 7400-3 incl. O-rings for actuation coding H, H 1/4.

Hole pattern of the manifold (top view)



1) Control port Z is only apparent at versions with hydraulic actuation coding H!

5. Appendix

5.1 Type BVG 11(12 and 2) or BVP 11(2)

Run-out design do not use for new layouts! (Alternative, type BVG 1 and BVP 1 acc. to D 7765)

Order examples:

BVG 11 R - G 24
BVP 2 S/B 1,5 - WG 230

Symbols (see table 2 sect. 2)
Attention: Symbol Z not available for type BVG 12 !

Table 5: Basic type and size

Coding	Design and connection	Flow Q_{max} (lpm)	Pressure p_{max} (bar)
BVG 11	G 1/4 Pipe connection ISO 228/1 (BSPP)	12	320
BVG 12	G 3/8	20 [1]	
BVG 2	G 3/8	20	
BVP 11	Manifold mounting	12	320
BVP 2		20	

Table 6: Additional orifice (at ports A, B, and C, see also sect. 3.1)

Basic type	Coding	Ø (mm)	for subsequent orders
BVG 11	**B 0,6**	0.6	7406 012 b
	B 1,1	1.1	7406 012 d
	B 1,3	1.3	7406 012 f
	B 1,5	1.5	7406 012 h
	[2]	0	7406 012 a
BVG 2	**B 1,5**	1.5	7400 003 c
	B 2,0	2.0	7400 003 f
	B 2,5	2.5	7400 003 i
	B 4,0	4.0	7400 003 b
	[2]	0	7400 003 a
BVP 11 BVP 2	**B 0,6**	0.6	7400 004 g
	B 0,8	0.8	7400 004 e
	B 1,1	1.1	7400 004 b
	B 1,3	1.3	7400 004 d
	B 1,5	1.5	7400 004 c
	B 2,0	2.0	7400 004 f
	B 2,5	2.5	7400 004 i
	[2]	0	7400 004 a

Table 7: Actuation modes

Actuation	Coding, note
Solenoid 	**G 12, L 12, X 12** **G 24, L 24, X 24** **WG 100, X 98** **WG 230, X 205** see table 4, sect. 2
	G 24 EX [3] Ex-proof design U_N = 24 V DC; p_{max} = 220 bar !
Manual 	**A** for type BVG 11(12) ! Body material and surface treatment = Steel (lever housing gas nitrated) Actuation torque = approx. 70 Nm at 320 bar

[1] With solenoid actuation:
20 lpm up to 200 bar
12 lpm up to 320 bar and ≤ 80% ED
see also sect. 3.1 "Flow"

[2] Undrilled for customized diameter acc. to Δp-Q-curve of the orifices, sect. 3.1

[3] Only with type BVP 11(2), not available for type BVG.. (housing dimensions to small - radiation insufficient)

Further parameters

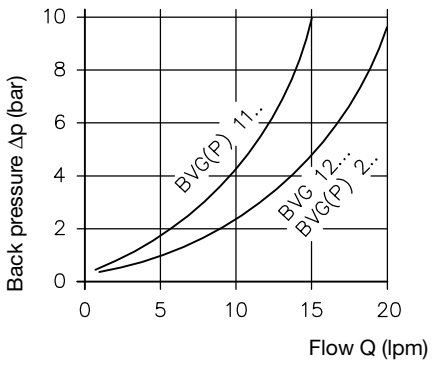
For general and electrical data see sect. 3.1 or 3.2

Mass (weight) approx. kg

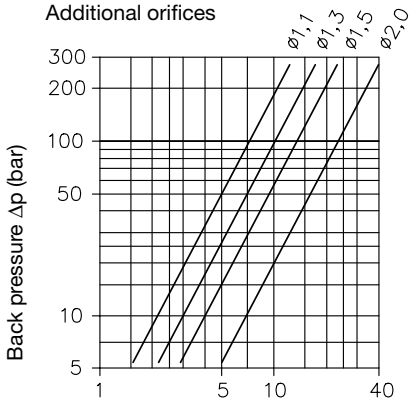
Complete with actuation	BVG 11 R(S) BVG 12 R(S)	BVG 11 Z	BVP 11 R(S)	BVP 11 Z
Solenoid	1.0	1.6	0.9	1.0
Manual	0.6	---	---	---
Complete with actuation	**BVG 2 R(S)**	**BVG 2 Z**	**BVP 2 R(S)**	**BVP 2 Z**
Solenoid	1.3	1.7	1.1	1.4

Δp-Q-curve

Basic valve



Additional orifices

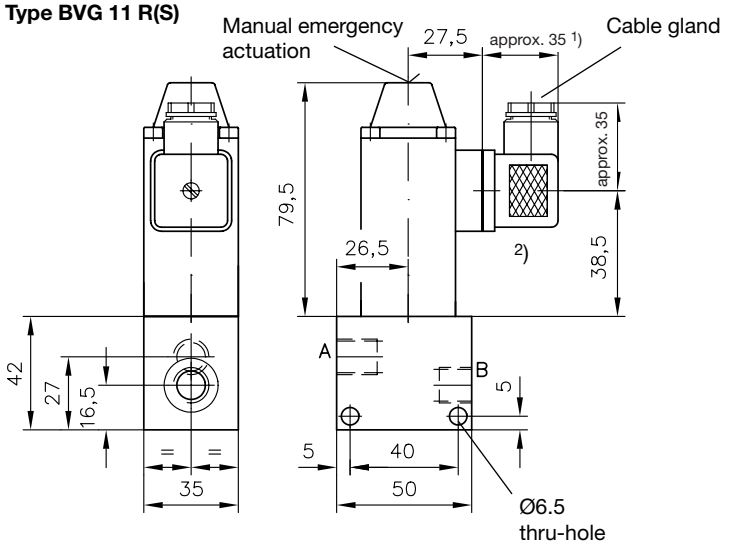


Viscosity of the oil during tests approx. 60 mm²/s

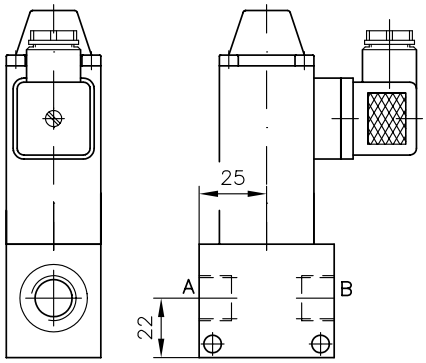
Unit dimensions
All dimensions are in mm and subject to change without notice!

Version for pipe connection
Illustration with solenoid actuation (coding **G..** or **WG..**); For manual actuations, see below

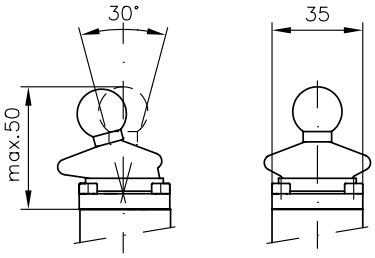
Type BVG 11 R(S)



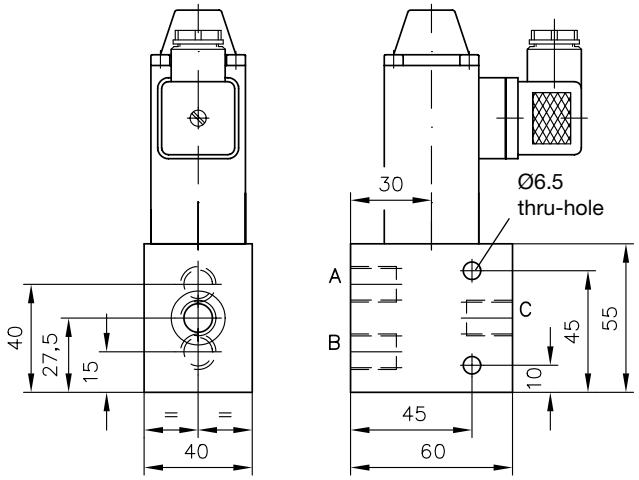
Type BVG 12 R(S)



Manual emergency actuation
Coding **A** (applies to type BVG ..11(12 and 2))

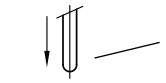


Type BVG 11 Z

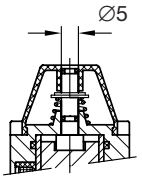


Ports conf. ISO 228/1 (BSPP):
A, B, and C = G 1/4 (BVG 11 R, S and Z)
= G 3/8 (BVG 12 R and S)

Manual emergency actuation
(applies to type BVG ..11(12 and 2))



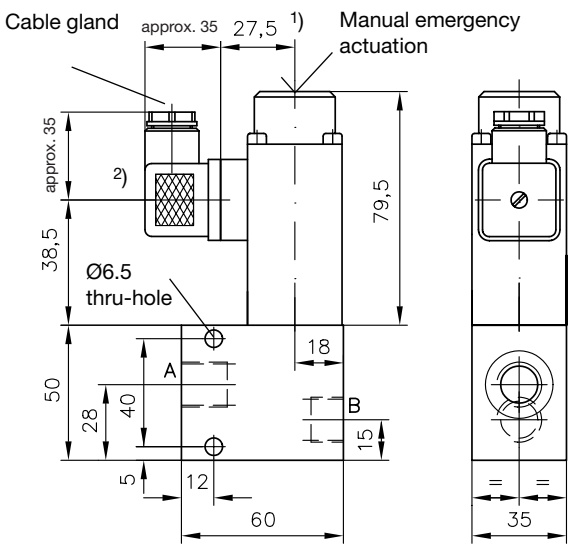
Actuation aid
(do not use any sharp-edged parts)



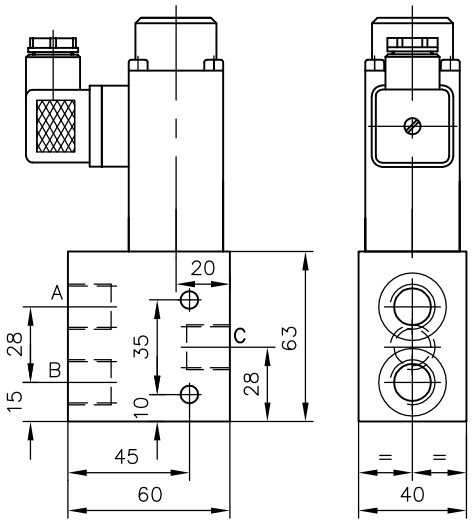
The valve may be actuated by pressing down the brass bolt visible from above by means of a steel pin or a screw driver etc.

Note: All pressure apparent at port B loads on the cross section of the brass bolt Ø5 i.e. 100 bar or 195 N !

Type BVG 2 R(S)



Type BVG 2 Z



Ports conf.
ISO 228/1 (BSPP):
A, B, and C = G 3/8

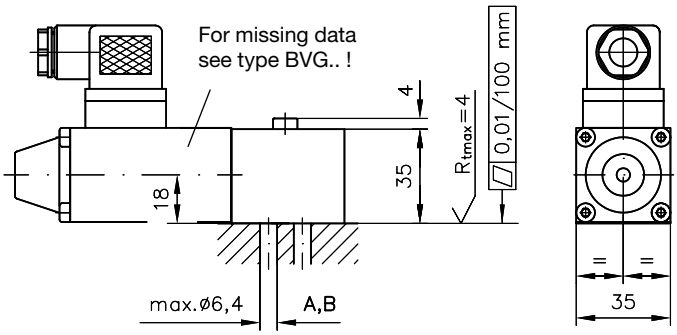
1) **Note:** This dimension is depending on the manufacturer and can be up to max. 40 mm acc. to DIN EN 175 301-803 !

2) When required the solenoid may be rotated to the valve body by another 4x90° in addition to the standard assembly position illustrated here.

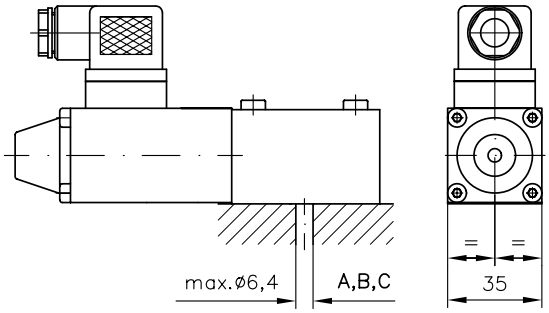
Version for manifold mounting

Illustration with solenoid actuation (coding **G..** or **WG..**), For manual actuations, see type BVG..

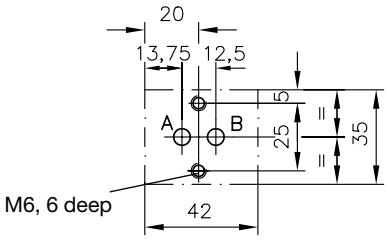
Type BVP 11 R(S)



Type BVP 11 Z



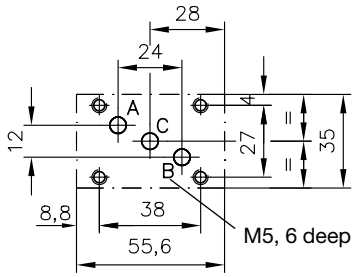
Hole pattern of the manifold (top view)



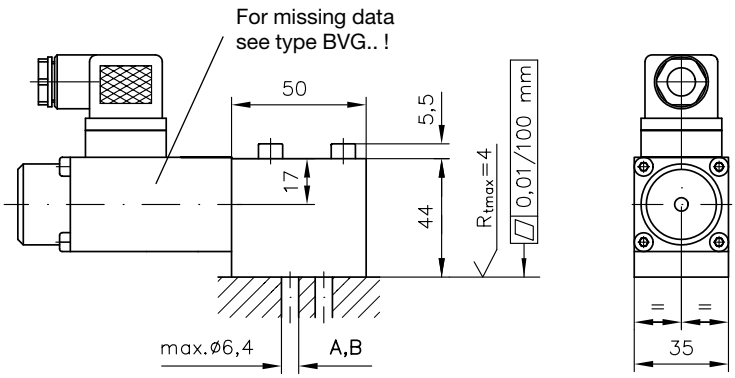
Sealing of ports A, B, and C via O-rings 7.65x1.78 NBR 90 Sh.

Available as spare part, seal-kit DS 7400-1.

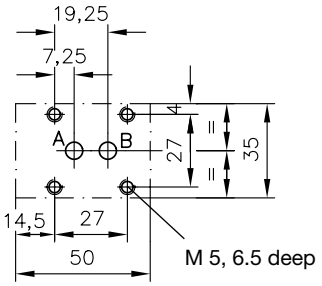
Hole pattern of the manifold (top view)



Type BVP 2 R(S)



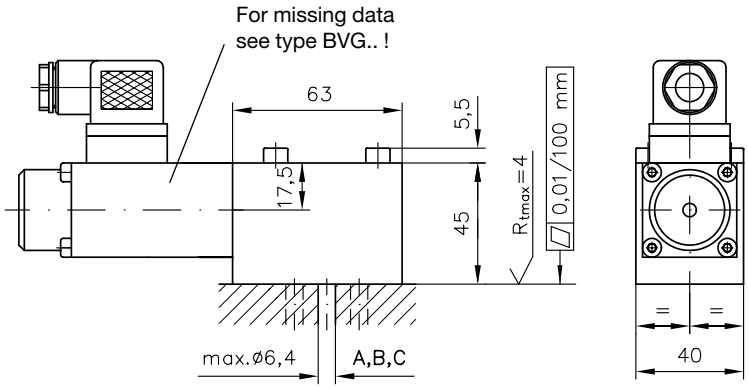
Hole pattern of the manifold (top view)



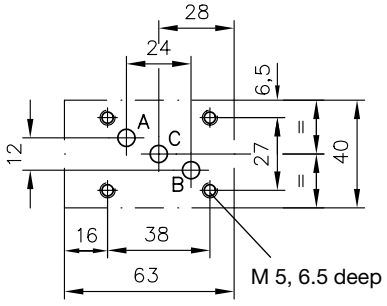
Sealing of ports A, B, and C via O-rings 7.65x1.78 NBR 90 Sh.

Available as spare part, seal-kit DS 7400-1.

Type BVP 2 Z



Hole pattern of the manifold (top view)



Sealing of ports A, B, and C via O-rings 7.65x1.78 NBR 90 Sh.

Available as spare part, seal-kit DS 7400-1.

5.2 2/2-way directional valve with by-pass check valve

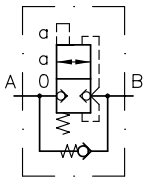
There is a modified version of valve type BVG-2R available, which may be equipped with a check valve to by-pass the blocked passage B→A.

Order example: BVG **R** 2 R - ...

Coding like in sect. 5.1

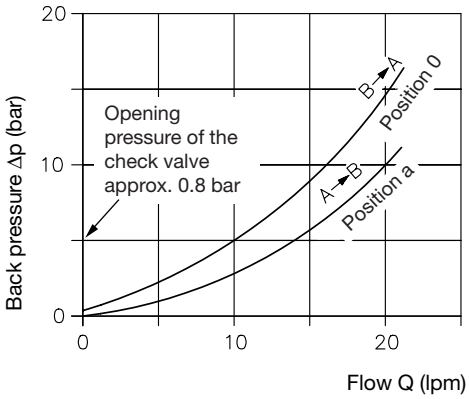
R = By-pass check valve

Symbol



Note: Dimensional drawing and mass (weight) like type BVG 2 R acc. to sect. 5.1

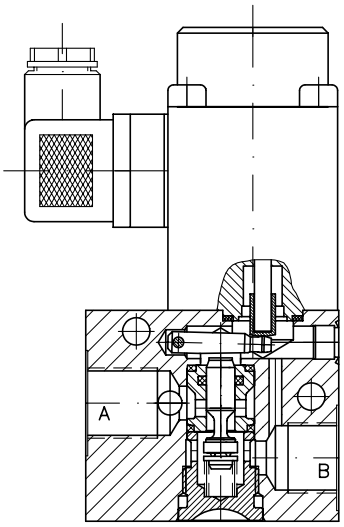
Δp-Q-curve



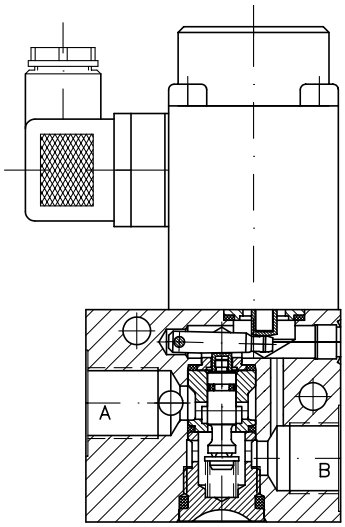
5.3 Schematic cross sectional views (standard versions acc. to sect. 2)

The schematic cross sectional views are represented here to show the functional principle, illustrated are valves in actuated state. They do apply to all actuations acc. to table 4.

Type BVG 3 R..



Type BVG 3 S..



Type BVG 3 Z..